CTIA - The Wireless Association

Location Based Services (LBS)

NTSB GA Search and Rescue Forum

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CTIA's Role in the Industry

CTIA-The Wireless Association® (www.ctia.org) is an international organization representing the wireless communications industry. CTIA advocates on behalf of its members at all levels of government.

The association also coordinates the industry's voluntary best practices and initiatives, and sponsors the industry's leading wireless tradeshows.

CTIA Members

- Wireless Carriers (MNOs)
- Device Manufacturers
- Network manufacturers
- Platform providers
- Application providers
- Content providers

Location Based Services (LBS)

Delivery of voice calls and data services:

Mobile services has always required network awareness of device location to appropriately route communications. This is not considered 'location based services'.

Location Based Services (LBS) for Consumers:

LBS uses device location to provide a "service" that the consumer wants apart from mere voice and data communication delivery from the network.

Typical Application of LBS:

Examples of Applications and services that use Location Information.

- Maps & Navigation
- Family Finders
- Phone Locators
- Social Network Enhancements
- 411 (local restaurants, gas stations, etc.)
- Safe Driving Applications
- Weather Information (e.g. TWC)

The Open Platform Mobile Ecosystem

- Wireless Carriers used to be the sole providers of the customer experience.
- Customer experiences on their phones are now dependent on multiple parties that may jointly (and separately) include the Wireless Carrier.
- This change is directly related to the open platform of the mobile ecosystem.
- Today, mobile applications are provided by tens of thousands of market participants who interact directly with consumers. This interaction may be via PC and mobile phone, or just mobile phone. The direct customer relationship with consumers is similar to the model that software providers have been using with personal computers for decades.
- Consequently, all participants in the ecosystem have a role to play in the collection and use of location information.
- CTIA, on behalf of the wireless industry, published Best Practices & Guidelines for LBS in 2009, and updated them in March 2010.

CTIA's Guidelines are available at this link:
http://www.ctia.org/business_resources/wic/index.cfm/AID/10331

CTIA LBS Best Practices and Guidelines
-Defining who is the Provider of LBS to the consumer

Due to multiple parties, and multiple methods of providing and accessing location information , who is the LBS Provider can be confusing

Use Case for an LBS Provider being the Application Provider:

A mobile user downloads an App - from a storefront accessed via mobile web- that will use and share location information based upon the device's GPS (including A-GPS) capability.

- The application may use carrier provided location information, or use additional (*i.e.,* end-user input) from a third party.
- In this case, the application provider is interacting with customer (just as a PC user interacts with software providers)
- The App developer is the LBS provider, and is responsible for Notice and Consent, per guidelines.

Use Case for an LBS Provider being the Wireless Carrier:

A mobile user downloads an App – from a wireless carriers application storefront - provided directly by a mobile carrier, which will use and share location information based upon the device's GPS (including A-GPS) capability, or other network capabilities.

- The application may use 100% carrier provided location information, or use additional (*i.e.,* GPS) location information from a third party.
- In this case, a carrier may use independent App developers to create "white label" LBS Apps, yet the end-user relationship governs.
- The carrier is the LBS provider as it provides the application and is responsible for Notice and Consent, per guidelines.

Note: *These cases refer to two of multiple examples. Please refer to the published LBS Guidelines for the full set of examples*

LBS Technology

Wireless Carrier

1. Access Point ID:
   A. Cell Tower (Sector) or
   B. Wi-Fi ID
2. 'Triangulation'
   A. Uplink- U-TDOA
   B. Downlink- AFLT, OTDOA
3. Assisted Global Positioning System (A-GPS)
4. Hybrid set of Technologies

Not Wireless Carrier

1. Global Positioning System ("GPS")
2. Third Party Crowd-Sourced Position Services *(mapping)*
   A. Independent Cell Tower mapping
   B. Wi-Fi hotspot mapping
3. End-User Entry

Note: *This is a demonstrative list of technologies available today, and is not exhaustive.*

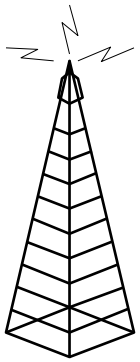
Thank You!

BACK UP Material

Location Data – Carrier Technologies

- Location Information is important information needed to deliver voice calls and call detail records.

- The Wireless Carrier also has ability to provide consumer services with location data for data services by these technologies:
  1. Access Point ID:
     - A. Cell Tower or
     - B. Wi-Fi ID
  2. Triangulation / Trilateration
     - A. Uplink- U-TDOA uplink time difference of arrival
     - B. Downlink- AFLT, OTDOA, downlink time difference of arrival
  3. Assisted Global Positioning System (A-GPS)
  4. Hybrid set of Technologies



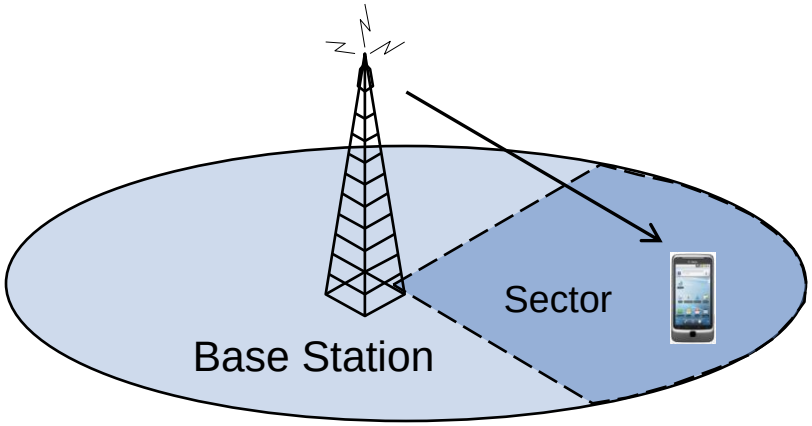
1. Access Point: A) Cell Tower/ Sector ID or B) Wi-Fi Location *

A. Carriers may provide Cell Sector information, or even simply a latitude & longitude (lat/long) of the tower. This data is not conducive to applications needing very specific location, but can be used for general uses of LBS.
B. Carriers may provide Wi-Fi access point networks to which the device can connect. This Location Information while specific, does not have a large circumference of coverage.

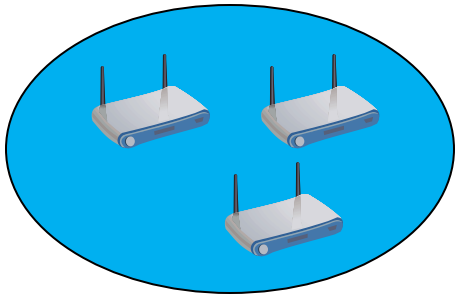
Security Example: If my phone is not in the sector – or using a Wi-Fi hotspot in the vicinity of- where I am transacting with my credit card, do not allow the transaction to go through.

Marketing Example: If my phone is in a sector – or using a Wi-Fi hotspot - where there is a store that I want notices for sales, please send me a text message.

**Note: Not all carriers provide Wi-Fi access points.*



Cell Tower Coverage



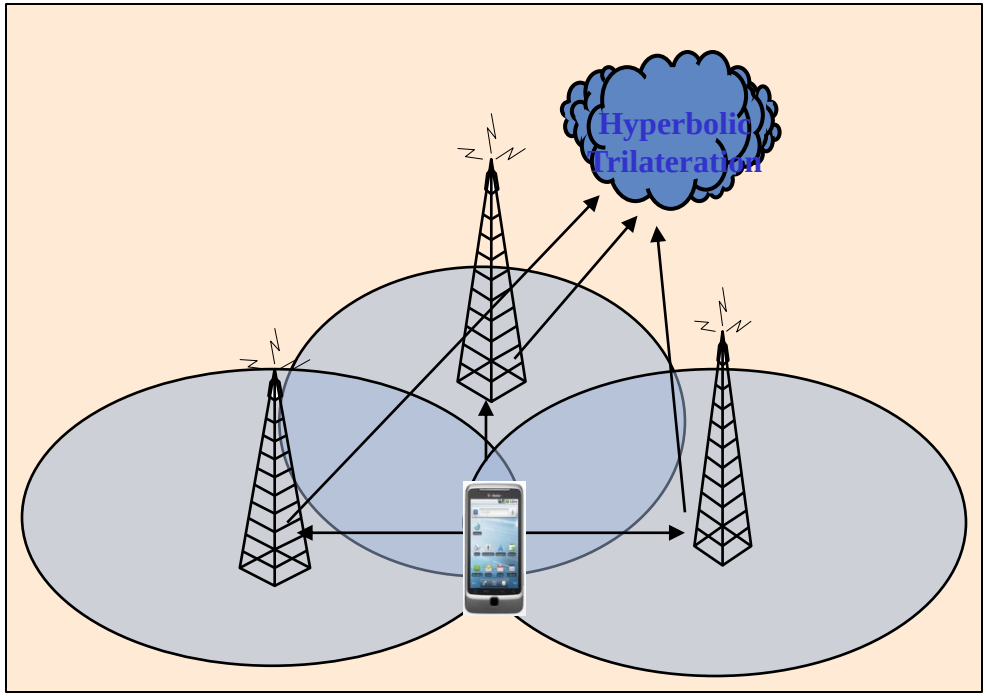
Wi-Fi Networks

2. Triangulation/ Trilateration: A) U-TDOA (Uplink – Time Difference of Arrival) B) OTDOA (Downlink -Observed Time Difference of Arrival)

Carrier could provide hyperbolic triangulation in the manner traditionally utilized to provide mobile E911. Trilateration is similar methodology. Notably, these methods are not generally practical for LBS due to system constraints.

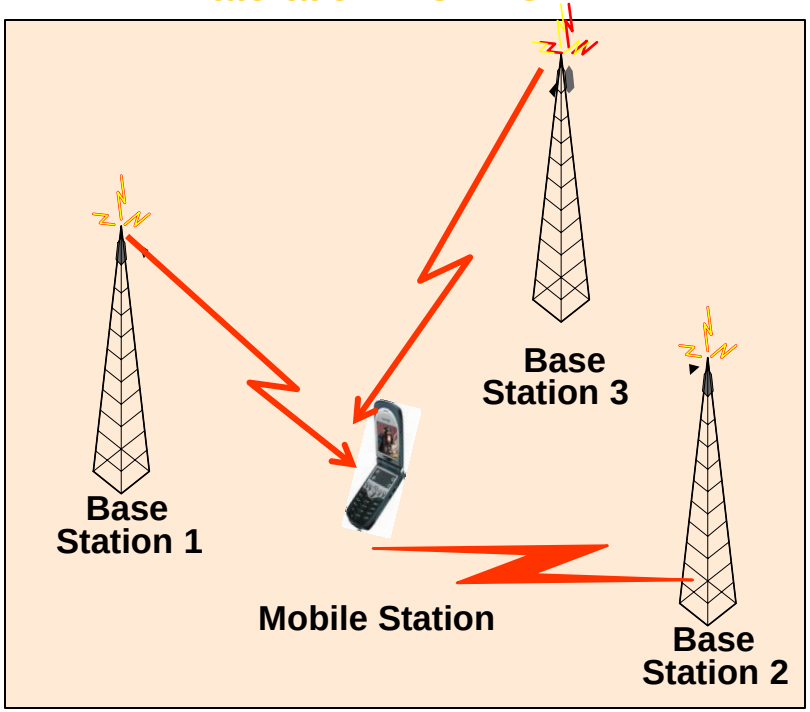
411 Example: Where is the closest restaurant to where my phone is now ?
Note – not optimal use of carrier resources to use this technology to provide this LBS.

Triangulation – U- TDOA



Cell Tower Coverage

Trilateration – OTDOA

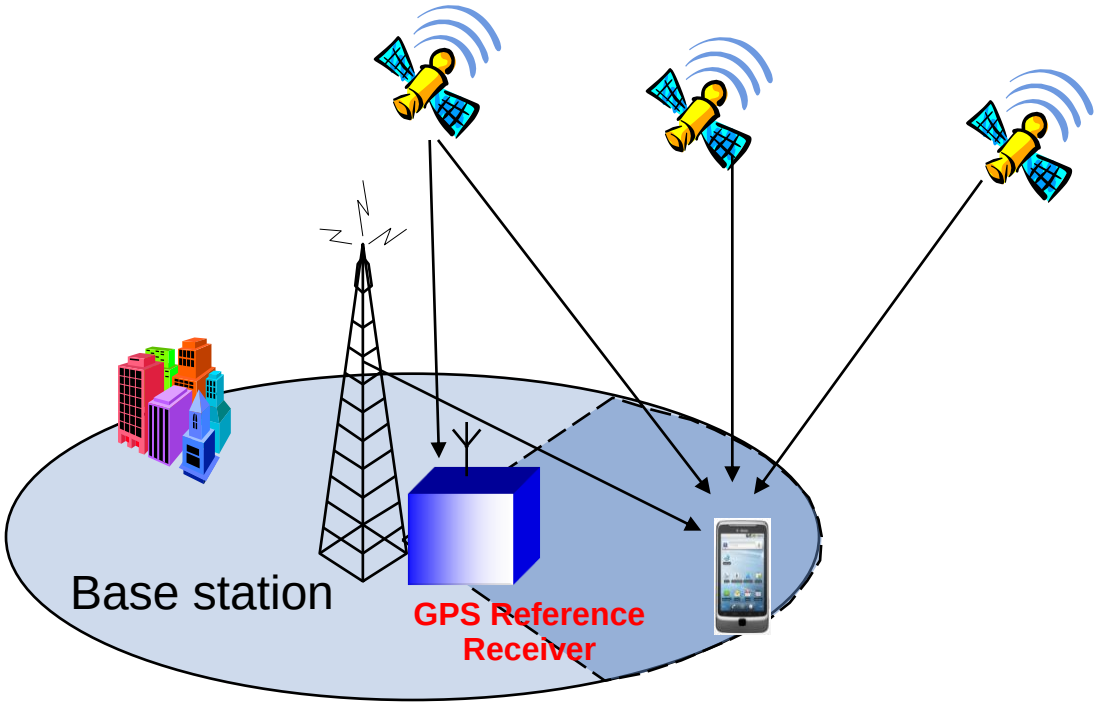


Synchronous deployment example

3. A-GPS (Assisted GPS)

Carrier provides assistance and/or calculations to device to assist in more quickly (and depending on potential interference, more accurately) locating the relevant satellites and calculating device location.

Navigation Example: Notify me of the route I should take through the mountains.



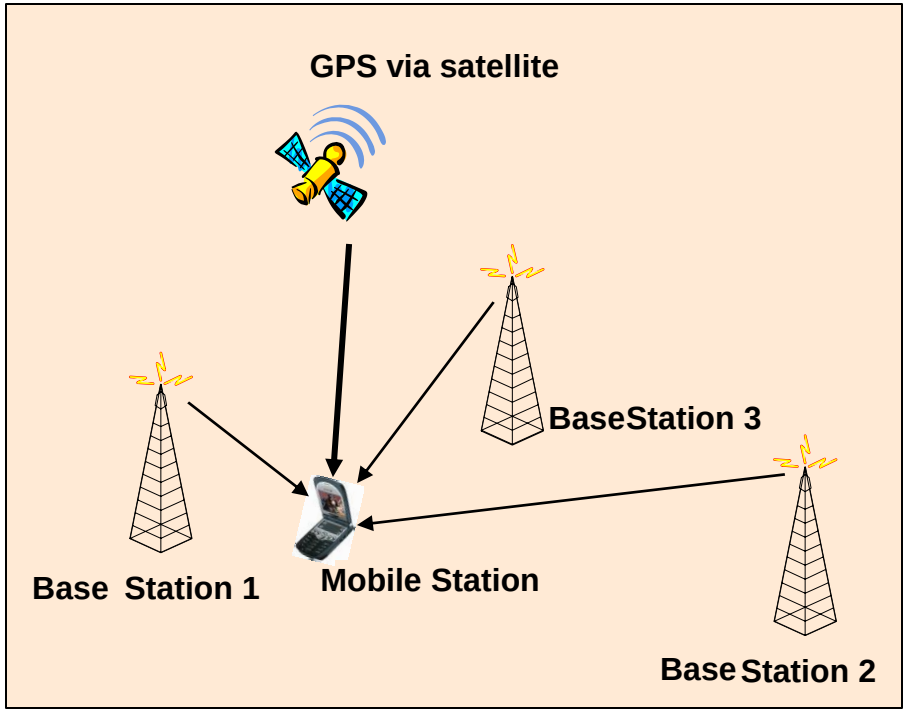
4. Hybrid Set* - GPS and AFLT

Carriers can combine network calculations with GPS for location that is more accurate than trilateration alone.

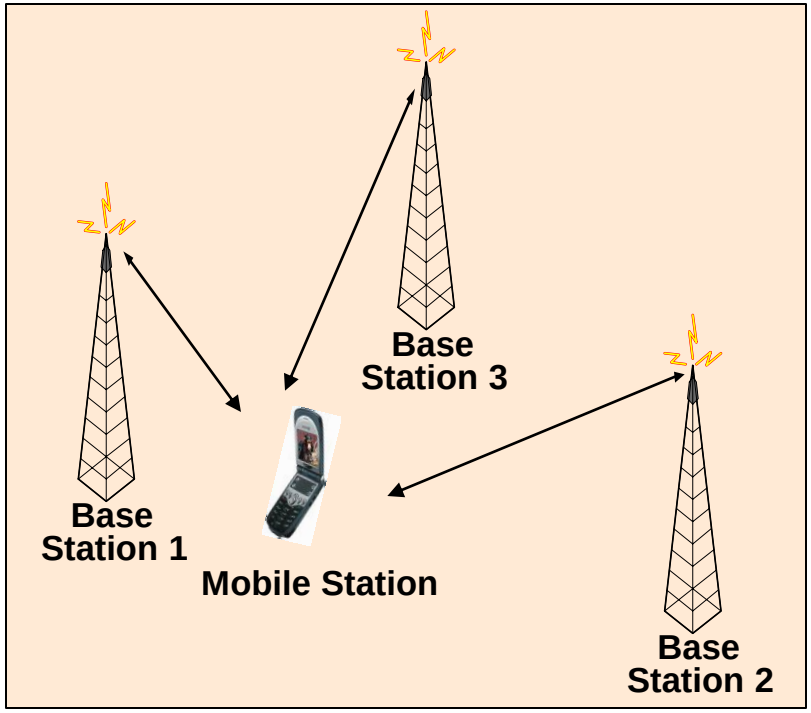
This hybrid is typically more accurate than AFLT-only, but less accurate than GPS. This is used when GPS-only solutions are not feasible.

**note: this solution only available on CDMA networks*

Hybrid GPS with AFLT



Trilateration – AFLT alone



Location Data – Non-Carrier Technologies

(Carrier Agnostic)

- Location Information can be gathered from technologies in which the wireless carrier has no influence

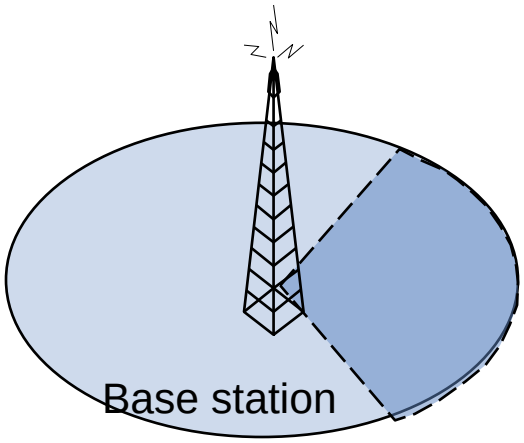
- Examples of location technologies utilized by mobile devices (and applications on mobile devices) that require **no carrier involvement** include:

  1. Global Positioning System (“GPS”)
  2. Third Party Mapping
     A. Independent Cell Tower mapping
     B. Wi-Fi hotspot mapping
  3. End-User Entry

1. GPS (Outside of E911)

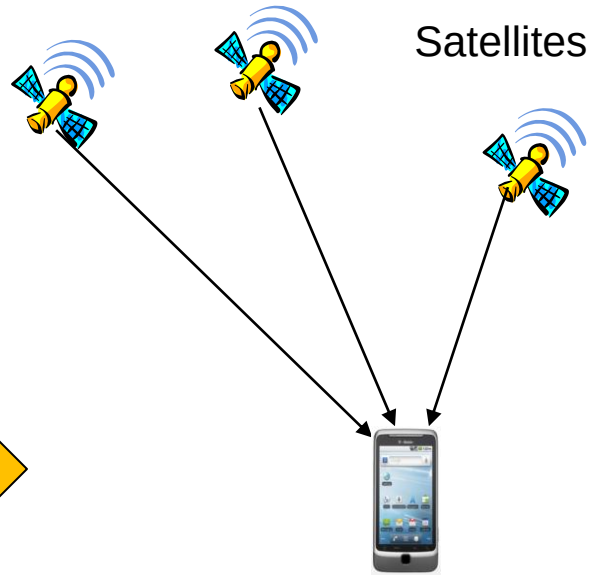
Devices (and applications) interact with satellite GPS system ***independent of mobile networks***

Example: I use an application that can locate my device by satellite, as I have opted into this feature when I downloaded the application.



Cell Tower Network

No interaction



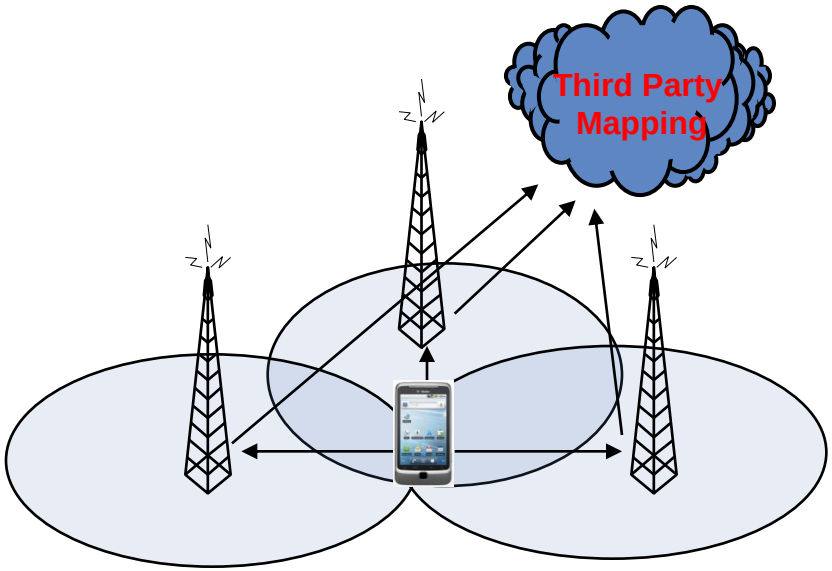
GPS Satellite Network

2. Third Party mapping

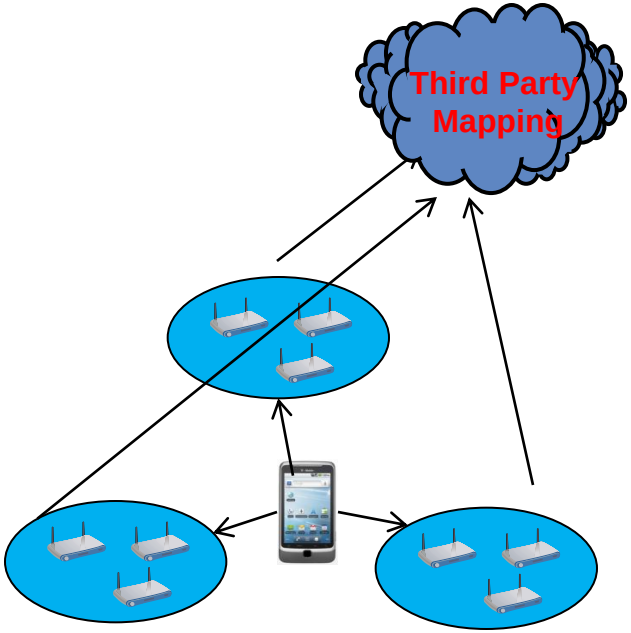
A) Cell Tower Mapping B) Wi-Fi hotspot Mapping

Third parties have the ability to independently map major carrier cell sites and Wi-Fi access points and use public transmission protocols to effectively triangulate location without carrier assistance.

Navigation Example: Is there high volume of traffic on the route I will take?
411 Example: Where is the nearest coffee shop?
Geo-Marketing: Send me offers when I am near my favorite coffee shop.



Cell Networks



Wi-Fi Networks